Appendix B: Report Tables

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TABLE 1 FEMA PROJECT WORKSHEETS RELATED TO HURRICANE SANDY DAMAGE TO THE FACILITY		
PW #	**Description**	**Repair Estimate**
UHBAJ37	Substations/Cabling	$34,816,850
0032	Temporary Facilities	$101,805
0075	Emergency Sludge Processing	$14,935,706
3589	Emergency Protective Measures	$2,591,618
3971	Debris Removal	
UHBAJ17	Administration Building	$2,000,000
2279	Administration Building Documentation Restoration	$1,463,595
4397	Cake Storage	$293,528
4399	Effluent Pump Station	$469,938
2055	Employee Services Building	$23,815
3471	Filter Press	$790,852
3588	Final Clarifiers	$5,828,095
2056	Fleet Vehicles/Equipment	$529,181
3475	Grit and Screening	$463,381
2058	Grit Incinerator	$165,807
UHBAJ23	Grounds	$16,978
UHBAJ24	Industrial Pollution Control (Lab)	$1,170,000
2083	Influent Pump Station	$418,996
2060	Main Security Building	$24,224
3473	Old Sludge Pumping	$187,886
UHBAJ29	Operation and Maintenance Building	$1,431,405
2274	Oxygen Decks	$423,955
2054	Oxygen Production	$65,593
2057	Oxygen Scrubber	$28,735
UHBAJ30	Primary Clarifiers	$3,366,411
2275	Return and Waste Sludge	$366,495
2281	Safety/Security (System)	$1,294,694
2277	Security Gate 3	$21,531
3472	Sludge Handling Maintenance	$165,181
UHBAJ34	Sludge Heat Treat (Zimpro)	$10,400,000
4099	Sludge Storage and Decant	$1,932,868
UHBAJ36	Sludge Thickeners	$2,557,015
2061	Supernatant Treatment	$378,808
2278	Trucked in Liquid Waste	$89,090
4168	Tunnels	$2,498,919

TABLE 1 FEMA PROJECT WORKSHEETS RELATED TO HURRICANE SANDY DAMAGE TO THE FACILITY		
PW #	**Description**	**Repair Estimate**
2059	Warehouse	$1,668
2276*	Wet Weather Pumping Station	$400,932

*The cost of 2276, the Wet Weather Pumping Station, has increased from the original project cost, $400,932 to $1,522,071.71 as of the most recently completed project worksheet entered into EMIS on March 25, 2014.

**An additional project worksheet for the Wet Weather Pumping Station, 5076, with a project cost of $122,363.50 was entered into EMIS on February 21, 2014.

TABLE 2 SUMMARY OF ALTERNATIVES					
Alternative	**Is Project Purpose Met?**	**Impacts to Natural Environment**	**Social Concerns**	**Economic Aspects**	**Legal Constraints**
No Action	No; taking no action would not safeguard against future flooding.	Plant failure during future flood events may result in similar negative impacts to environment/ waterway.	Risk of future loss of wastewater treatment services.	No immediate outlay of public funds, but risk of future loss of facility and operations due to flood.	NA
Component Floodproofing and On-Site Standby Power System	Yes	Similar to Proposed Alternative.	N/A	Costs > Proposed Alternative.	N/A
Elevating the entire site above the floodplain	Yes	Similar to Proposed Alternative.	N/A	Costs > Proposed Alternative.	N/A
Relocate the Facility outside floodplain	Yes	Presumed to be additional significant environmental impacts associated with development of large scale "green" site on prior developed urban expanse.	Major disruption to community due to construction of off-site infrastructure to serve new facility.	Cost significantly > Proposed Alternative.	Major environmental permitting constraints with new facility.
Construct floodwall and on-site standby power system (Proposed Alternative)	Yes	Minor impacts easily mitigated	N/A	Least cost of viable alternatives.	N/A

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Geology/Soils	No Action	X							
	Proposed Alternative		X				Hudson Essex Passaic Soil Conservation District (HEPSCD) Soil Erosion and Sediment Control Plan Certification	Soil erosion and sediment control measures to be employed.	No impact to unique or protected geology or soils.
	Component Floodproofing/On-Site Standby Power System		X						
Air Quality	No Action		X						In the event of power outage, increased emissions would result from use of temporary combustion equipment.
	Proposed Alternative		X				NJDEP Title V Air Permit Modification.	Air emission controls to be installed and permit operational limits to be adhered to.	Net positive benefit is projected for on-site standby power system due to offset of utility-generated power at higher emission rates.
	Component Floodproofing/On-Site Standby Power System		X				NJDEP Title V Air Permit Modification.	More extensive air emission controls and operational limits.	

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Wetlands/Water Resources	No Action	X							
	Proposed Alternative			X			NJDEP Individual Wetlands permit.	Wetland disturbance mitigated on-site through creation/enhancement/restoration of wetland areas.	Impact to emergent wetland due to construction of floodwall and stormwater outfall structures mitigated on-site; rip rap in tidal creeks for energy dissipation considered temporary disturbance.
	Component Floodproofing/On-Site Standby Power System		X						
Floodplains	No Action	X							
	Proposed Alternative		X				NJDEP Flood Hazard Area Individual Permit.		Tidal flood supersedes fluvial in Jasper Creek.
	Component Floodproofing/On-Site Standby Power System		X						
Coastal Zone	No Action	X							
	Proposed Alternative		X						
	Component Floodproofing/On- Site Standby Power System		X						
Vegetation	No Action	X							
	Proposed Alternative		X					Minor temporary disturbance to wetland vegetation and turf areas to be mitigated and locally restored.	
	Component Floodproofing/On-Site Standby Power System				X				

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Wildlife and Fish	No Action	X							
	Proposed Alternative		X						Potential for localized and limited, short-term disruption to wildlife patterns during construction.
	Component Floodproofing/On-Site Standby Power System		X						Potential for localized and limited, short-term disruption to wildlife patterns during construction.
Threatened and Endangered Species	No Action	X							
	Proposed Alternative		X				NJDEP approvals through wetland and flood hazard area permitting.	Impact to potential habitat to be mitigated and/or restored.	No significant adverse direct impact to habitat for listed species (black-crowned night heron and cattle egret). NJDEP has confirmed no T&E habitat of concern on site through the wetlands delineation process.
	Component Floodproofing/On-Site Standby Power System		X						
Cultural Resources-Archaeological	No Action	X							
	Proposed Alternative			X			NJSHPO concurrence anticipated.	Archaeological monitoring recommended.	Proposed action will result in protection of resources.
	Component Floodproofing/On-Site Standby Power System					X	NJSHPO concurrence required.	HABS/HAER recordation, archaeological monitoring required at a minimum.	Major physical and visual effects to flood proof buildings and below-ground historic infrastructure.

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Cultural Resources-Historic Buildings	No Action	X							
	Proposed Alternative		X				NJSHPO concurrence anticipated.	Archaeological monitoring recommended.	Proposed action will result in protection of resources.
	Component Floodproofing/On-Site Standby Power System					X	NJSHPO concurrence required.	HABS/HAER recordation, archaeological monitoring required at a minimum.	Major physical and visual effects to floodproof buildings and belowground historic infrastructure.
Environmental Justice	No Action	X							
	Proposed Alternative		X						COC is not a disproportionately high or adversely burdened community.
	Component Floodproofing/On-Site Standby Power System		X						COC is not a disproportionately high or adversely burdened community.
Noise	No Action	X							
	Proposed Alternative		X					Noise attenuation included with on-site standby power system design.	Will comply with state and local noise standards.
	Component Floodproofing/On-Site Standby Power System			X					

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Traffic	No Action	X							
	Proposed Alternative		X						
	Component Floodproofing/On-Site Standby Power System		X						
Public Services and Utilities	No Action	X							
	Proposed Alternative			X					Project purpose is to prevent loss of function of this critical infrastructure wastewater treatment plant. Stormwater management plan involves modifications to plant localized stormwater management system by bifurcating on-site drainage from existing to independent system. On-site standby power system will support and provide redundancy to existing electric supply grid.
	Component Floodproofing/On-Site Standby Power System			X					

TABLE 3
SUMMARY OF POTENTIAL IMPACTS TO AFFECTED ENVIRONMENT

Affected Environmental/ Resource Area	Alternatives	IMPACT					Agency Coordination/ Permits	Mitigation/BMPs	Comments
		No Impact	Negligible	Minor	Moderate	Major			
Public Health and Safety	No Action					X			With no action, the facility remains vulnerable to a similar flood event.
	Proposed Alternative					X			Alternative protects the public health and safety during a future flood event.
	Component Floodproofing/On-Site Standby Power System					X			Alternative protects the public health and safety during a future flood event
Hazardous Materials	No Action	X							
	Proposed Alternative			X			LSRP oversight.	Soil management plan to be implemented.	
	Component Floodproofing/On-Site Standby Power System				X		LSRP oversight.	Soil management plan to be implemented.	Impact to infrastructure and operations of each process component and building.
Climate Change	No Action		X						In the event of power outage, increased emissions would result from use of temporary combustion equipment.
	Proposed Alternative		X						
	Component Floodproofing/On-Site Standby Power System		X						

TABLE 3	IMPACT DEFINATIONS
No Impact	The resource would not be impacted
Negligible	The resource would not be impacted, or changes would be non-detectable or if detected, impacts would be slight and local. Impacts would be well below regulatory limits
Minor	Impacts to the resource would be measurable, although the changes would be small and localized. Impacts would be within or below regulatory limits. Mitigation measures may be necessary to reduce potential effects
Moderate	Impacts to the resource would be measurable and have localized and potentially regional scale impacts. Impacts would be within or below regulatory limits, but historical conditions would be altered on a short-term basis. Mitigation measures may be necessary to reduce potential effects
Major	Impacts would be readily measurable and would have substantial consequences on a local and potentially regional level. Impacts would exceed regulatory limits. Mitigation measures to offset the effects would be required to reduce impacts, although long-term changes to the resource would be possible

Table 4
National and New Jersey Ambient Air Quality Standards

Pollutant	Standard	Averaging Period	New Jersey (a)		National (b)	
			($\mu g/m^3$)	(ppm)	($\mu g/m^3$)	(ppm)
Sulfur Dioxide (SO_2)	Primary	24-hour average (c)	365	0.14	365	0.14
		1-hour average (d)	-----	-----	196	0.075
		12-month arithmetic mean	80	0.03	80	0.03
	Secondary	3-hour average (c)	1300	0.50	1300	0.50
		24-hour average	260	0.10	-----	-----
		12-month arithmetic mean	60	0.02	-----	-----
Total Suspended Particulates (TSP)	Primary	24-hour average	260	-----	-----	-----
		12-month geometric mean	75	-----	-----	-----
	Secondary	24-hour average	150	-----	-----	-----
		12-month geometric mean (e)	60	-----	-----	-----
Inhalable Particulates (PM_{10})	Primary and Secondary	24-hour average (f)	-----	-----	150	-----
		Annual arithmetic mean (g)	-----	-----	-----	-----
Fine Particulates ($PM_{2.5}$)	Primary and Secondary	24-hour average (h)	-----	-----	35	-----
		Annual arithmetic mean (i)	-----	-----	15	-----
Carbon Monoxide (CO)	Primary and Secondary (j)	1-hour average	40,000	35	40,000	35
		8-hour average	10,000	9	10,000	9
Ozone (O_3)	Primary	Max daily-1 hour average	235	0.12	-----	--- (k)
	Secondary	1-hour average	160	0.08	-----	-----
	Prim. and Sec.	8-hour average	-----	-----	150	0.075 (l)
Nitrogen Dioxide (NO_2)	Primary	1-hour average (m)	-----	-----		0.1
	Prim. and Sec.	12-month arithmetic mean	100	0.05	100	0.053
Lead (Pb)	Prim. and Sec.	3-month average	1.5	-----	0.15 (n)	-----

Notes:

(a) New Jersey short-term standards are not to be exceeded more than once in any 12-month period.
(b) National short-term standards are not to be exceeded more than once in a calendar year, unless otherwise noted.
(c) National standards are block averages rather than moving averages, unless otherwise noted.
(d) Standard is met when the 3-year average of the 99th percentile of the daily maximum 1-hour average is less than or equal to 0.075 ppm (effective June 2, 2010).
(e) Intended as a guideline for achieving short-term TSP standard.
(f) 99th percentile of 24-hour PM_{10} concentrations in a year, averaged over 3 years
(g) The previous (1997) PM_{10} annual National Standard of 50 $\mu g/m^3$ was rescinded (effective December 18, 2006).
(h) 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over 3 years. The standard was changed from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ (effective December 18, 2006).
(i) Standard is met when the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations, from single or multiple community-oriented monitors, is less than or equal to the standard.
(j) National secondary standards for carbon monoxide were revoked in 1985.
(k) The previous 1-hour ozone national standard of 0.12 ppm is no longer in effect for most areas, including New Jersey.
(l) Standard is met when the 3-year average of the 4th highest daily maximum 8-hour average is less than or equal to 0.075 ppm (effective May 27, 2008).
(m) Standard is met when the 3-year average of the 99th percentile of the daily maximum 1-hour average is less than or equal to 0.1 ppm (effective January 22, 2010).
(n) The national standard was changed from 1.5 $\mu g/m^3$ (quarterly mean) to 0.15 $\mu g/m^3$ (3-month rolling average) (effective January 12, 2009).

Table 5
Background Ambient Air Quality Data

Pollutant	Averaging Period	AAQS (a)	2010		2011		2012		Monitoring Location
			Maximum	2nd High	Maximum	2nd High	Maximum	2nd High	
PM_{10} ($\mu g/m^3$)	24-hr	150	109	65	63	61	87	73	Jersey City Hudson County
$PM_{2.5}$ ($\mu g/m^3$)	24-hr	35	34.5	27.6	27.7	27.5	23.5	23.4	Newark Essex County
	Annual	15	9.1	--	10.5	--	9.0	--	
SO_2 (ppm)	1-hr	0.075	0.034	0.021	0.023	0.023	0.017	0.015	Newark Essex County
	3-hr	0.5	0.018	0.018	0.021	0.019	NA (b)	NA (b)	
	24-hr	0.14	0.011	0.010	0.010	0.009	0.006	0.005	
	Annual	0.03	0.002	--	0.002	--	NA (b)	--	
NO_2 (ppm)	1-hr	0.1	0.072	0.072	0.085	0.075	0.081	0.080	East Orange Essex County
	Annual	0.05	0.019	--	0.021	--	NA (b)	--	
Ozone (ppm)	1-hr	0.08	0.109	0.104	0.100	0.100	0.111	0.094	Newark Essex County
	8-hr	0.075	0.091	0.088	0.091	0.091	0.082	0.082	
CO (ppm)	1-hr	35	3.6	3.3	4.0	3.5	2.8	2.6	Newark Essex County
	8-hr	9	3.0	2.2	2.8	2.8	1.7	1.7	

Source:
NJDEP Air Quality Reports for 2010, 2011 and 2012; USEPA AirData, retrieved October 22-23, 2012 and June 19, 2013
Notes:
(a) Most stringent of Primary or Secondary National or New Jersey Standard
(b) Data not available for this averaging period

Table 6
Component Floodproofing/On-Site Standby Power System
Worst-Case Annual Emissions from Diesel Standby Generators

Proposed Standby Generator Sizes					Caterpillar Nominal Emissions Data (a)			
	Qty.	Rated Output ekW	Rated Input MMBTU/hr	Rated Engine hp	NOx g/hp-hr	CO g/hp-hr	HC g/hp-hr	PM g/hp-hr
	2	600	5.6	896	5.84	0.5	0.1	0.04
	1	1,000	9.4	1,474	4.93	0.2	0.1	0.02
	2	1,250	12.2	1,841	4.93	1.3	0.1	0.20
	4	1,500	14.0	2,209	4.08	0.5	0.2	0.04
	13	2,000	18.7	2,937	5.54	0.6	0.1	0.12
	7	2,500	22.5	3,681	5.32	0.5	0.1	0.04
	5	4,000	35.8	5,890	5.07	0.6	0.2	0.04
Totals	34	74,200	680.7					

- Annual Operating Hours:		Uncontrolled Annual Emissions (Total for All Generators)					
		SO_2 tons/yr (b)	GHG (CO_2e) tons/yr (c)	NOx tons/yr	CO tons/yr	VOC tons/yr (d)	$PM_{10}/PM_{2.5}$ tons/yr (e)
Testing & Maintenance	78	**0.04**	**4,338**	**49.0**	**5.5**	**1.3**	**0.7**

Significant Net Emissions Increase Thresholds						
	SO_2 tons/yr	GHG (CO_2e) tons/yr	NOx tons/yr	CO tons/yr	VOC tons/yr	$PM_{10}/PM_{2.5}$ tons/yr
N.J.A.C. 7:27-18	40	NA	25	100	25	15 / 10
PSD	40	75,000	40	100	NA	15 / 10

Notes:

(a) Emissions (nominal) from Caterpillar spec sheets for Tier 2 engines, without add-on controls

(b) SO_2 emissions calculated based on 15 ppmw Ultra Low Sulfur Diesel fuel

(c) Emissions of greenhouse gases (GHG)(CO_2 equivalent) calculated using an emission factor of 163.4 lb/MMBTU, from EPA Mandatory Greenhouse Gas Reporting Rule (40 CFR Part 98)

(d) VOC emissions calculated using hydrocarbon (HC) emission factor

(e) PM_{10} and $PM_{2.5}$ emissions are assumed to be equivalent to total PM emissions.

Table 7
Proposed Alternative - Stationary Source Emissions
Standby Solar Titan 250 Turbine Generators Firing Natural Gas

On-Site Standby Power System Basis of Design		Each Turbine	Two Turbines	Black Start Engine (a)
Gross electrical output (ISO)	MW	19	38	1.25
Max rated heat input (HHV)	MMBTU/hr	201.2	402.4	12.2
Max annual hours at rated heat input	Hours	1,000		250
Max annual electrical output	MWh/yr	19,000	38,000	
Max annual heat input (HHV)	MMBTU/yr	201,200	402,400	3,050

Pollutant	Projected Emissions							Significant Net Emissions Increase/ Permit Applicability Thresholds	
	2 Gas Turbines with SCR & Oxidation Catalyst			Diesel Black Start Engine (a)			Power Plant Total Tons/Yr	N.J.A.C. 7:27-18 Tons/Yr	PSD Tons/Yr
	ppmvd @15% O2 (b)	lb/MMBTU (HHV)	Tons/Yr	g/hp-hr (max)	lb/MMBTU (HHV)	Tons/Yr			
Nitrogen Oxides (NOx)	2.5	0.009	1.9	5.92	--	3.0	**4.9**	**25**	**40**
Carbon Monoxide (CO)	3.0	0.007	1.4	1.3	--	0.7	**2.1**	**100**	**100**
Sulfur Dioxide (SO_2)	--	0.0034 (c)	0.7	--	0.0015	0.0	**0.7**	**40**	**40**
Volatile Organic Compounds (VOC)	4.0	0.005	1.0	0.15	--	0.1	**1.1**	**25**	**NA**
$PM_{10}/PM_{2.5}$ (filterable + condensable)	--	0.018 (d)	3.6	0.2	--	0.1	**3.7**	**PM10: 15 PM2.5: 10**	**PM10: 15 PM2.5: 10**
Particulate Matter (filterable)	--	0.011 (e)	2.2	0.2	--	0.1	**2.3**	**25**	**25**
Ammonia (NH_3)	5.0	0.007	1.4	NA	NA	0.0	**1.4**	**NA**	**NA**
Greenhouse Gases (CO_2e) (f)	--	117	23,540	--	163.4	249	**23,790**	**NA**	**75,000**
Hazardous Air Pollutants (HAPs)	Below NJDEP de minimus reporting thresholds							**NA**	**NA**

Notes:

(a) Black Start Engine will comply with NSPS Subpart IIII; maximum 100 hr/yr maintenance/testing + maximum 150 hr/yr emergency use
Black Start Engine data and emissions based on Caterpillar spec sheet and NSPS emission limits

(b) Based on NJDEP SOTA levels with SCR and oxidation catalyst

(c) USEPA AP-42 emission factor

(d) Solar Turbines data

(e) PM (filterable) from gas turbines conservatively estimated at 60% of total $PM_{10}/PM_{2.5}$

(f) Greenhouse gases (GHG) (CO_2 equivalent) emission factors from EPA Mandatory Greenhouse Gas Reporting Rule (40 CFR Part 98)

Table 8
Proposed Alternative – Net Air Quality Benefit
Comparison of Emissions from Proposed On-Site Standby Power System with Utility Grid Emissions

Maximum annual electrical output 38,000 MWh/yr (a)

	Proposed On-Site Standby Power System (b)		Electric Utility Grid Power		Net Benefit
Pollutant	lb/MWh	tons/yr	lb/MWh (c)	tons/yr (d)	tons/yr
NOx	0.26	4.9	0.73	13.9	9.0
SO_2	0.04	0.7	1.31	24.9	24.2
GHG (CO_2e)	1252	23,788	1269	24,112	323.4

Notes:

(a) Maximum annual electric power generation from two 19 MW gas turbines operating 1000 hrs/yr at rated output

(b) Proposed On-Site Standby Power System emissions include turbines and black start generator. Emission rate in lb/MWh is calculated from maximum annual emissions divided by maximum annual electric power output (38,000 MWh).

(c) Annual non-baseload emission rates for New Jersey from EGRID2012 year 2009 data, without correction for line losses

(d) Electric utility annual emissions calculated based on 38,000 MWh/yr

Table 9
Proposed Alternative - Projected Hazardous Air Pollutant (HAP) Emissions
Two Standby Solar Titan 250 Turbine Generators Firing Natural Gas with SCR and Oxidation Catalyst

On-Site Standby Power System Basis of Design		Each Turbine	Two Turbines
Gross electrical output (ISO)	MW	19	38
Max rated heat input (HHV)	MMBTU/hr	201.2	402.4
Max annual hours at rated heat input	Hours	1,000	
Max annual heat input (HHV)	MMBTU/yr	201,200	402,400

Pollutant	Emissions Before Control (Two Turbines)		Controlled Emissions (Two Turbines)			N.J.A.C. 7-22 *De minimus* Reporting Threshold
	lb/MMBTU (HHV)	lb/hr	Control Efficiency (a)	lb/hr	lb/yr	lb/yr
1,3-Butadiene	< 4.3E-07 (b,c)	1.7E-04	85%	2.6E-05	0.026	14
Acetaldehyde	4.5E-05 (b)	0.018	85%	2.7E-03	2.7	1,800
Acrolein	8.3E-06 (b)	3.3E-03	85%	5.0E-04	0.50	8
Benzene	1.0E-04 (b)	0.040	85%	6.0E-03	6.0	400
Ethylbenzene	2.6E-05 (b)	0.010	85%	1.6E-03	1.6	2,000
Naphthalene	1.4E-06 (b)	5.6E-04	85%	8.5E-05	0.08	2,000
PAH (d)	2.3E-06 (b)	9.3E-04	85%	1.4E-04	0.14	2
Propylene Oxide	< 2.9E-05 (b,c)	0.012	85%	1.8E-03	1.8	1,000
Toluene	1.3E-04 (b)	0.052	85%	7.8E-03	7.8	2,000
Xylenes	6.4E-05 (b)	0.026	85%	3.9E-03	3.9	2,000
Formaldehyde	2.9E-03 (e)	1.2	85%	0.18	175	400

Notes:

(a) AP-42, Section 3.1 Stationary Gas Turbines (April 2000) indicates oxidation catalyst control efficiency in the range of 85% to 90%.

(b) Emission Factor Documentation for AP-42, Section 3.1 Stationary Gas Turbines (April 2000); emission factors listed are worst case: average for all engine loads or average for high loads (80% load and higher) only.

(c) "<" indicates compound was not detected; the emission factor is based on one-half of the detection limit.

(d) Polycylic aromatic hydrocarbons (PAHs), also known as polycylic organic matter (POM)

(e) EPA 2003. Revised HAP Emission Factors for Stationary Combustion Turbines, OAR-2002-0060, IV-B-09, 8/22/03): 95% Upper Confidence of Data, all engine loads

Table 10
Proposed Alternative –Risk Screening Worksheet

NJDEP DIVISION OF AIR QUALITY RISK SCREENING WORKSHEET
For Long-Term Carcinogenic and Noncarcinogenic Effects and Short-Term Effects

August 2011

For references for toxicity data (URFs and RfCs), see the lists at www.nj.gov/dep/aqpp/risk.html.

Date	8/15/2013
Facility ID No.	07349
Activity ID No.	N/A
Facility name	PVSC - two 19 MW gas turbines @ 1000 hr/yr
Facility location	Newark, NJ

Stack height (a)	100	ft
Distance to property line	50	ft
Annual air impact value, C'	1.144	$(ug/m^3)/(ton/yr)$
24-hour air impact value, C'_{st}	17.6	$(ug/m^3)/(lb/hr)$

KEY:

Long-Term Effects

- Q = Annual emission rate (in tons per year)
- C = C' x Q = Annual average ambient air concentration
- URF = Unit risk factor (for carcinogenic risk)
- IR = C x URF = Incremental risk (for carcinogen)
- RfC = Reference concentration (for noncarcinogenic effects)
- HQ = C/RfC = Hazard quotient (for noncarcinogenic risk)

Short-Term Effects

- Q_h = Hourly emission rate (in pounds per hour)
- C_{st} = C'_{st} x Q_h = Short-term average ambient air concentration
- RfC_{st} = Short-term reference concentration (for noncarcinogenic effects)
- HQ_{st} = C_{st}/RfC_{st} = Hazard quotient for short-term noncarcinogenic effects

PVSC - two 19 MW gas turbines @ 1000 hr/yr

				LONG-TERM EFFECTS						SHORT-TERM EFFECTS			
	HA	CAS No.	Chemical	Q (ton/y	C (ug/m	URF [(ug/m^3)$^{-1}$]	IR	RfC (ug/m	HQ	Q_h (lb/hr	C_{st} (ug/m	RfC_{st} (ug/m	HQ_{st}
1	*	75070	Acetaldehyde	1.4E-03	1.6E-03	2.2E-06	**3.4E-09**	9	**1.7E-04**	2.7E-03	1.2E-01	470	**2.5E-04**
8	*	107028	Acrolein	2.5E-04	2.9E-04	NA	NA	0.02	**1.4E-02**	5.0E-04	2.2E-02	2.5	**8.8E-03**
16		7664417	Ammonia	1.4E+00	1.6E+00	NA	NA	100	**1.6E-02**	2.8E+00	1.2E+02	3200	**3.9E-02**
26	*	71432	Benzene	3.0E-03	3.5E-03	7.8E-06	**2.7E-08**	30	**1.2E-04**	6.0E-03	2.7E-01	1300	**2.0E-04**
28	**	50328	Benzo(a)pyrene (PAH/POM)***	6.9E-05	7.9E-05	1.1E-03	**8.7E-08**	NA	NA	1.4E-04	NA	NA	NA
39	*	106990	Butadiene (1,3-)	1.3E-05	1.5E-05	3.0E-05	**4.5E-10**	2	**7.4E-06**	2.6E-05	NA	NA	NA
103	*	100414	Ethylbenzene	7.8E-04	9.0E-04	2.5E-06	**2.2E-09**	NA	NA	1.6E-03	2.8E-02	1000	**2.8E-05**
119	*	50000	Formaldehyde	8.8E-02	1.0E-01	1.3E-05	**1.3E-06**	9	**1.1E-02**	1.8E-01	7.7E+00	55	**1.4E-01**
169	*	91203	Naphthalene	4.2E-05	4.8E-05	3.4E-05	**1.6E-09**	3	**1.6E-05**	8.5E-05	NA	NA	NA
206	*	75569	Propylene oxide	8.8E-04	1.0E-03	3.7E-06	**3.7E-09**	30	**3.3E-05**	1.8E-03	7.7E-02	3100	**2.5E-05**
221	*	108883	Toluene	3.9E-03	4.5E-03	NA	NA	5000	**9.0E-07**	7.8E-03	3.5E-01	37000	**9.3E-06**
241	*		Xylene (m-,o-,p-, or mixed isomers)	1.9E-03	2.2E-03	NA	NA	100	**2.2E-05**	3.9E-03	1.7E-01	22000	**7.7E-06**

TOTALS	Total Cancer Risk	**1.4E-06**	Total Hazard Index	**4.2E-02**
				Total Short-term Hazard Index **1.9E-01**
RISK/HAZARD CRITERIA (b)		**1.5E-06**		**1.0**

NOTE:

* Clean Air Act hazardous air pollutant (HAP)

** Clean Air Act hazardous air pollutant, but not listed individually (part of a group)

*** PAH or POM may be considered to be all benzo(a)pyrene.

(a) 100 ft is Good Engineering Practice stack height based on building height of 40 feet. The spreadsheet conservatively assumes building downwash and no plume rise.

(b) NJDEP risk/hazard criteria:

Incremental Risk (IR) less than or equal to 1E-6 (1 in 1 million) is considered negligible (acceptable); values of 1.5 or less are rounded down to 1.

Hazard Quotient (HQ) less than or equal to 1 is considered negligible (acceptable); values of 1.5 or less are rounded down to 1.

Table 11
Proposed Alternative - General Conformity Applicability Assessment
Estimated Peak Year Annual Exhaust and Crankcase Emissions from Nonroad Construction Equipment

Phase	Equipment	Qty	Hrs/Yr	hp	Load Factor	Emission Factors (g/hp-hr)				Annual Emissions (tons/yr)			
						HC	CO	NOx	PM	VOC	CO	NOx	PM2.5
Flood Wall	Pile driver	2	2000	170	0.59	0.20	1.53	2.62	0.48	0.09	0.67	1.16	0.21
	Backhoe	2	2000	97	0.21	0.44	7.00	3.66	0.70	0.04	0.63	0.33	0.06
	Loader	14	500	97	0.21	0.44	7.00	3.66	0.70	0.07	1.10	0.58	0.11
	Backhoe/Loader	2	2000	97	0.21	0.44	7.00	3.66	0.70	0.04	0.63	0.33	0.06
	Loader	4	2000	97	0.21	0.44	7.00	3.66	0.70	0.08	1.26	0.66	0.13
	Truck	30	500	511	0.59	0.18	1.48	2.62	0.32	0.92	7.40	13.06	1.62
	Truck	2	2000	511	0.59	0.18	1.48	2.62	0.32	0.24	1.97	3.48	0.43
	Concrete truck	4	500	511	0.59	0.18	1.48	2.62	0.32	0.12	0.99	1.74	0.22
	Crane	2	2000	511	0.43	0.17	0.97	2.52	0.22	0.17	0.94	2.44	0.21
	Compressor	4	2000	76	0.21	0.20	4.17	3.14	0.43	0.03	0.59	0.44	0.06
Wall Construction Total Annual Emissions										**1.80**	**16.17**	**24.22**	**3.11**
Pump Stations	Crane	2	2000	511	0.43	0.17	0.97	2.52	0.22	0.17	0.94	2.44	0.21
	Truck	14	500	511	0.59	0.18	1.48	2.62	0.32	0.43	3.45	6.10	0.76
	Truck	4	2000	511	0.59	0.18	1.48	2.62	0.32	0.49	3.94	6.97	0.86
	Backhoe/Loader	1	2000	97	0.21	0.44	7.00	3.66	0.70	0.02	0.31	0.16	0.03
Pump Stations Construction Total Annual Emissions										**1.10**	**8.65**	**15.67**	**1.86**
Power Plant	Pile driver	1	500	170	0.59	0.20	1.53	2.62	0.48	0.01	0.08	0.14	0.03
	Backhoe/Loader	3	500	97	0.21	0.20	4.17	3.14	0.43	0.01	0.14	0.11	0.01
	Truck	7	500	511	0.59	0.18	1.48	2.62	0.32	0.21	1.73	3.05	0.38
	Concrete truck	1	500	511	0.59	0.18	1.48	2.62	0.32	0.03	0.25	0.44	0.05
Power System Construction Total Annual Emissions										**0.26**	**2.20**	**3.73**	**0.47**
All Phases Total Peak Year Annual Emissions										**2.90**	**24.82**	**39.89**	**4.98**
General Conformity De Minimis Emission Thresholds										**50**	**100**	**100**	**100**

Notes:

All engines are assumed to be Tier 3 diesel engines.

Emission factors and calculations from *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition*, EPA-420-R-10-018 NR-009d, July 2010.

NONROAD Emission Factor = Zero-hour Steady-State Emission Factor x Transient Activity Factor (TAF) x Deterioration Factor (DF)

HC emission factors include crankcase emissions (2% of exhaust emissions).

Annual Emissions (tons/yr) = Qty x Hrs/Yr (per piece of equipment) x hp x Load Factor x Emission Factor (g/hp-hr) x (1 lb/453.6 g) x (1 ton/2000 lb)

Emissions from wall construction are based on two crews working simultaneously.

All Phases Total Peak Year Annual Emissions = Wall Construction Total Annual Emissions + the larger of Pump Stations Construction Total Annual Emissions or Power Plant Construction Total Annual Emissions (assuming that construction of pump stations and power plant will not occur during the same year).

VOC emissions are assumed to be equal to HC emissions; PM2.5 emissions are assumed to be equal to PM emissions.

TABLE 12 Previously Identified Cultural Resources within One-Half Mile of the Project Site				
Reference #	**Site Name**	**Location**	**Distance and Direction from Subject Property**	**SR/NR Status**
3,135.000	Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works	Doremus and Wilson Avenues	On subject property	SHPO Opinion 1/14/1997
3,120.000	Lehigh Valley Railroad Oak Island Yard Historic District	Conrail right-of-way	Immediately south	SHPO Opinion 1/14/1997
4,420.000	Pennsylvania Railroad New York Bay Branch Historic District	South of Conrail right-of-way	1,200 feet south	SHPO Opinion 4/22/2005
4,186.000	Newark and Elizabeth Branch of the Central Railroad of New Jersey	West of New Jersey Turnpike	1,600 feet west	SHPO Opinion 8/30/2000

Table 13 Extant Buildings and Structures over 50 Years of Age Associated with The Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District					
Building or Structure	**Date Completed**	**Designer (If Known) / Style**	**FEMA Determination**	**Disposition**	**Location**
Passaic Valley Interceptor Sewer	Ca. 1920	Unknown / N.A.	Contributing	Belowground, in use	Primarily along the Passaic River. Small component in western end of project area
Newark Shaft	Before 1924	William M. Brown, et al.	Contributing	Both above- and belowground, in use	Within and below the Head House
Wet Weather Pumping Station	1924	Frederick A. Phelps, William M. Brown, et al. / Neo-Classical	Contributing	Aboveground, in use	Western portion of project area
Venturi Chamber Building	1924	Frederick A. Phelps, William M. Brown, et al. / Neo-Classical	Contributing	Aboveground, not in use	Western portion of project area.
Head House	1924 with significant late-20th-century exterior modifications	Frederick A. Phelps, William M. Brown, et al. / Neo-Classical	Contributing	Aboveground, in use	Eastern portion of project area
Wallington Pumping Station	Ca. 1924	Frederick A. Phelps, William M. Brown, et al. / Neo-Classical	Contributing	Aboveground, in use	Wallington, New Jersey
Yantacaw Pumping Station	Ca. 1924	Frederick A. Phelps, William M. Brown, et al. / Neo-Classical	Contributing	Aboveground, in use	Clifton, New Jersey
Historic Main Conduits	Ca. 1924	William M. Brown, et al.	Contributing	Belowground, not in use	Between Wet Weather Pump Station and Head House
Outfall Tunnel	Ca. 1924	William M. Brown, et al.	Contributing	In bedrock, underwater, in use	From subject property to Robbins Reef, New York Bay

Table 13
Extant Buildings and Structures over 50 Years of Age Associated with The Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District

Building or Structure	Date Completed	Designer (If Known) / Style	FEMA Determination	Disposition	Location
Robbins Reef Diffusor Structure	Ca. 1924	William M. Brown, et al.	Contributing	Underwater, in use	Robbins Reef, New York Bay
Unit 2 Sedimentation Basins	Late 1920s	Unknown	Contributing	Belowground, partially demolished, not in use	Between Wet Weather pumping Station and Head House
Unit 3 Sedimentation Basins	Ca. 1936	Unknown	Contributing	Belowground, partially demolished, not in use	Between Wet Weather pumping Station and Head House
Old Sludge Conduits	After 1957	Various	Non-Contributing	Belowground, not in use	Between Old Sludge Pumping Station and sedimentation basins
Old Sludge Pumping Station	Ca. 1958	Bogert and Childs / Modern-Industrial	Non-Contributing	Aboveground, in use	Eastern portion of project area
Old Sludge Storage Tanks*	Ca. 1966 - 1970	Unknown / N.A.	Non-Contributing	Aboveground, in use	Eastern portion of project area

*Additional research using aerial imagery was undertaken by FEMA in April 2014 to confirm the construction date of the Old Sludge Storage Tanks. This was completed after PS&S had submitted their Phase IA Cultural Resource Reconnaissance Study, dated December 6, 2013, which dated the construction of the Tanks ca. 1958.

Table 14
Noise Monitoring Results

Monitoring Locations		Receiving Property Category (a)	Predominant Ambient Noise Influences	Total Sound Level (including offsite ambient/ background sound)			State/Local Sound Level Standard (d) [dBA]
ID	Description			Leq (b) [dBA]	L90 [dBA]	Lmin [dBA]	
NM-1	West of the facility 33 Rutherford St	Commercial	Truck and car traffic on Rutherford Ave, Turnpike traffic	71.7	61.5 (c)	58.2	65/65
NM-2	South of proposed on-site standby power system location, near the facility property line adjoining Hess	Industrial	Truck, bus and car traffic on Doremus Ave	60.3	54.5 (c)	52.8	NA/75
NM-3	South of proposed on-site standby power system location, - City of Newark property on south side of Delancey St	Community Service	Heavy truck traffic on Delancey St, freight train	78.5	68.4	64.7 (c)	65/65
NM-4	Northeast of proposed on-site standby power system location, - north side of Wilson Ave east of Doremus Ave	Industrial	Truck, bus and car traffic on Doremus Ave	69.2	60.5 (c)	59.1	NA/75
NM-5	North of proposed on-site standby power system location, - NJ Transit Bus Garage on north side of Wilson Ave	Commercial	Truck, bus and car traffic on Wilson Ave and Doremus Ave	72.0	61.8 (c)	58.1	65/65

Notes:

All sound-level measurements were obtained by a PS&S acoustical professional trained and certified under the New Jersey State Noise Code (N.J.A.C. 7:29) and Rutgers Noise Technical Assistance Center.

Sound-level measurement data was collected on July 18, 2013.

Daytime monitoring was performed between 10:30 AM and 2:00 PM (NJDEP Regulated Daytime Period is 7 AM to 10 PM).

A calibrated Bruel and Kjaer Model 2250 Type I precision sound-level meter equipped with a wind screen and set to the 'slow' measurement speed was used to obtain sound-level data. At the beginning and end of the sound-level monitoring, wind speed, temperature and barometric pressure were recorded, and the meter calibration was verified at the beginning and end of the monitoring event.

(a) Receiving property type as defined in the New Jersey State Noise Code

(b) Leq values over the 15 to 17 minute monitoring periods, to be used as a baseline for evaluating project impacts

(c) Sound level to be compared with standard

(d) New Jersey State Noise Code (N.J.A.C. 7:29)/City of Newark Sound Level Standards are applicable only to noise emitted from a specific facility/activity and do not include background (ambient) noise levels from offsite sources.

Table 15
Estimated Outdoor Construction Noise Levels (dBA)

Construction Phase	Typical Average Outdoor Noise Levels at Construction Site Boundaries (a)	Estimated Outdoor Construction Noise Levels at Distances from Construction Site Boundary (b,c)							
		100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	1000 ft	1500 ft
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)
Excavation	89	83	77	73.5	71	69	67.5	63	59.5
Pile Driving	101	95	89	85.5	83	81	79.5	75	71.5
Foundation	77	71	65	61.5	59	57	55.5	51	47.5
Erection	84	78	72	68.5	66	64	62.5	58	54.5
Finishing	89	83	77	73.5	71	69	67.5	63	59.5

Notes:

(a) Source: USEPA "Noise from Construction Equipment", 1971

(b) Estimated from (a) and approximate distance from site (Greenberg, et al. 1979)

(c) Projected sound levels at the Site boundary will vary with the type and location of the construction activity on the Site. Because construction activities would be carried out at various locations and because these activities change as work progresses, the construction site would have both spatial and temporal noise dimensions. Noise levels at the various receptors will depend on the work activity, the proximity of the work activity (relative location on site/distance to receptor), and existing noise sources (trucks, buses, and other background sources).

Table 16
Difference in Sound Levels Due to Outdoor Construction Noise Levels (dBA)

Construction Phase	Maximum Difference in Sound Level Due to Outdoor Noise Levels at Construction Site Boundaries	Maximum Difference in Sound Level Due to Outdoor Construction Noise Levels at Distances from Construction Site Boundary							
		100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	1000 ft	1500 ft
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)
Excavation	29	23	17	13.5	11	9	7.5	3	-
Pile Driving	41	35	29	25.5	23	21	19.5	15	11.5
Foundation	17	11	5	1.5	-	-	-	-	-
Erection	24	18	12	8.5	6	4	2.5	-	-
Finishing	29	23	17	13.5	11	9	7.5	3	-
Existing Sound Levels (a)		60 to 72				60 to 79	60 to 72		

Notes:

(a) Existing Daytime Sound Levels [Leq(1)] based on field measurements

(b) Refer to Table N-2 for "Estimated Outdoor Construction Noise Levels at Distances from Site Boundary"

(c) Shaded area indicates no difference in sound level due to outdoor construction noise

Table 17 Proposed Alternative - Sound Model Inputs 2 Solar Titan 250 Turbine Generators in Operation (1 Turbine Standby)		
Sound Source	**Source Sound Pressure Level**	**Source Height Above Grade**
Combustion exhaust with silencer (each of 2)	73.6 dBA at 50 feet	100 feet
Combustion air inlet with silencer (each of 2)	82 dBA at 50 feet	29 feet (louvers on east side of building)
Unenclosed package (mechanical noise) (each of 2)	118 dBA at 50 feet (includes 10 dBA noise reduction from noise attenuating louvers)	8 feet (louvers on west side of building)
Building and Floodwalls		
Power system building	Base elevation: 5.9 feet	Building height: 40 feet above grade
West floodwall	Base elevation: 5.9 feet	Top of wall elevation 17 feet
East floodwall	Base elevation: 5.9 feet	Top of wall elevation 19 feet

Table 18
Proposed Alternative - Modeled Noise Impacts
Two Solar Titan 250 Turbine Generators Operating

	Noise Impact Receptor	Modeled Noise Impact [dBA]	State/Local Sound Level Standard [dBA] (a)	Representative Noise Monitoring Location	Monitored Leq [dBA] (b)	Total Leq [dBA] (c)	Increase in Leq [dBA]
1	West of the facility 33 Rutherford St	33.9	65/65	NM-1	71.7	71.7	0.0
2	South of turbine site Hess property line	55.3	NA/75	NM-2	60.3	61.5	1.2
3	South of turbine site City of Newark property on south side of Delaney St	55.2	65/65	NM-3	78.5	78.5	0.0
4	Northeast of turbine site north side of Wilson Ave east of Doremus Ave	62.7	NA/75	NM-4	69.2	70.0	0.9
5	North of turbine site NJ Transit Bus Garage north side of Wilson Ave	60.8	65/65	NM-5	72.0	72.3	0.3
6	Northwest of turbine site NJ Transit Bus Garage north side of Wilson Ave	49.2	65/65	NM-5	72.0	72.0	0.0
7	West of the facility Rutherford St	37.9	NA/75	NM-1	71.7	71.7	0.0

Notes:
(a) New Jersey State Noise Code (N.J.A.C. 7:29)/City of Newark Sound Level Standards are applicable only to noise emitted from a specific facility/activity and do not include background (ambient) noise levels from offsite sources.
(b) Leq values over the 16 to 17 minute monitoring periods, to be used as a baseline for evaluating project impacts
(c) Modeled noise Impact combined with monitored Leq